$$pH = -\log[H_3O^+]$$

$$pOH = -\log[OH^-]$$

$$pH + pOH = 14.00$$

$$[H_3O^+] = 10^{-pH}$$

$$[OH^-] = 10^{-pOH}$$

$$[H_3O^+] \times [OH^-] = K_W$$

$$K_a \times K_b = K_W$$

$$pK_a = -\log[K_a]$$

$$pK_b = -\log[K_b]$$

$$[H_3O^+] = \sqrt{K_a \times [acid]}$$

$$pH = pK_a + \log\left(\frac{[base]}{[acid]}\right)$$

$$[OH^-] = \sqrt{K_b \times [base]}$$

$$K_W = 1.0 \times 10^{-14}$$

$$C_aV_a = C_bV_b$$

$$M = \frac{mol}{L\ so\ln}$$

$$\%\ comp\ i = \frac{m\ of\ i}{total\ m} \times 100$$

$$PV = nRT$$

$$1nm = 10^{-9}m \qquad 1m = 100cm$$

$$K = {}^\circ C + 273.15$$

$$\Delta U = q + w$$

$$w = -P\Delta V$$

$$101.3J = 1L.atm$$

$$q = m \times C_s \times \Delta T$$

$$q = -C_{cal} \times \Delta T$$

$$q = -m_{sol'n} \times C_s \times \Delta T$$

$$\Delta S_{Rxn}{}^\circ = \Sigma nS^\circ_{(prod)} - \Sigma mS^\circ_{(react)}$$

$$\Delta H_{Rxn}{}^\circ = \Sigma nH_f{}^\circ_{(prod)} - \Sigma mH_f{}^\circ_{(react)}$$

$$\Delta S^\circ_{surr} = \frac{-\Delta H^\circ_{sys}}{T}$$

$$\Delta S^\circ_{univ} = \Delta S^\circ_{sys} + \Delta S^\circ_{surr}$$

$$\Delta G_{Rxn}{}^\circ = \Sigma nG_f{}^\circ_{(prod)} - \Sigma mG_f{}^\circ_{(react)}$$

$$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$$

$$\Delta G^\circ = -RT \ln K \qquad R = 8.314 \frac{J}{mol.K} = 0.0821 \frac{L.atm}{mol.K}$$

$$K = e^{-\left(\frac{\Delta G^\circ}{RT}\right)}$$

$$E_{photon} = h\nu = \frac{hc}{\lambda} = hc\tilde{\upsilon} \qquad \tilde{\upsilon} = \frac{1}{\lambda}$$

$$h = 6.626 \times 10^{-34} J.s \qquad N_A = 6.022 \times 10^{23} mol^{-1}$$

$$c = 3.00 \times 10^8 \frac{m}{s} = 3.00 \times 10^{10} \frac{cm}{s} \qquad 1kJ = 1000J$$